## REMARKS

This amendment is being filed along with a Request for Continued Examination (RCE) application in response to the final Office Action having a mailing date of April 12, 2006. Claims 1, 3, and 6 are amended. Claim 2 has been canceled. Dependent claim 7 has been added. No new matter has been added. With this amendment, claims 1, and 3-7 are pending in the application.

### I. Discussion of Informality Claim Objections

In section 1 of the final Office Action, on pages 2-3, claims 1-5 were objected to because the use of the phrase "optical modulation patterns" in the claims was confusing and indefinite. Also on page 3, in section 1(3), the Examiner provided suggestions for claim amendments, for which the applicant thanks the Examiner.

Specifically, the applicant has amended claims 1 and 3 to replace the phrase, "optical modulated patterns are recorded" with "servo projection structures are formed" so as to more clearly recite the claimed subject matter. Amended claims 1 and 3, and claim 6 are now presented in a condition that is clear, definite, and supported by the specification. Accordingly, the applicant respectfully requests the Examiner withdraw the informality objection.

### II. Discussion of Claim Rejections Under 35 USC § 103

#### a. Hormimai's signal and servo beams travel on the same optical path

The final Office Action stated in section 3 that Horimai teaches, "since the address servo areas (6) are only located at certain positions of the servo layer, the beam path for the servo beam and the beam path for the signal or reference beam are either implicitly different or would have been obvious to one skilled in the art to specifically make it different by moving the objective lens via the actuator (13, Figure 1)." The applicant respectfully disagrees with this reading of Horimai.

Horimai's Figure 1 shows instead that, while the focal points for the signal beam and the servo beam are different, both the signal beam and the servo beam travel along the same

optical path, perpendicular to the medium (1, Figure 1). *E.g.*, Horimai's invention is quickly distinguished because it comprises only one light source, and therefore, the optical signal path of Horimai's signal and servo beams will be necessarily identical.

This is not at all like amended claims 1, 3, and 6 of the present application, which recite, *inter alia*, "setting a first optical path of the signal beam … and setting a second optical path, different than the first optical path, of a servo beam." *See*, *e.g.*, Figure 1 of the present application, showing a non-limiting embodiment where servo beam 10 and signal beam 12 follow different optical paths.

b. Horimai's invention does not suffer from noise interference

The final Office Action further states that "retrieving the servo information and retrieving the recorded holographic information will not be interfering with each other to reduce the possible reading noise." On this point, the applicant agrees with the Examiner because unlike the applicant's device, Horimai's device does not allow simultaneous operation of a servo beam and a signal beam. Horimai clearly discloses the use of a "basic clock reproduced from a reproduction signal" [0135], [0142], and [0154], from which "the controller 90 predicts the timing at which light that has exited the objective lens 12 passes through the address servo areas 6" [0135]. *E.g.*, Horimai has two separate and distinct, mutually exclusive types of beam operation: 1) A signal beam used to read/write data areas, and 2) A servo beam used to read address servo areas.

Horimai describes these distinct types of "operation" in separate paragraphs of his specification. First, in paragraph [0135] - [0136], Horimai describes "a servo operation … with reference to FIG. 4." In the servo type of operation, Horimai's one light source is used as a servo beam to read address servo areas 6.

Next, in paragraphs [0140] – [0142] and [0153] – [0154] respectively, Horimai describes "a recording operation … with reference to FIG. 6," and a "reproducing operation… with reference to FIG. 9." In this second type of operation (recording/reproducing), Horimai's one light source is used as a signal beam to read or write data areas 7.

Because they operate at different times, the servo beam and the signal beam of Horimai cannot interfere with each other. Horimai does not in any way disclose, teach, or suggest either operations where the "servo beam is emitted … at the same time as the signal beam," as recited in claims 1 and 6, or operations where "the first light source and the second light source [are] being driven simultaneously," as recited in claim 3. More so, it would not be obvious to one skilled in the art to use the one light source in Horimai's invention to simultaneously access servo areas 6 and data areas 7.

c. Amble does not use lasers with different wavelength to avoid cross talk or to minimize interference

In section 3, the final Office Action stated that Amble teaches an optical data storage system with focus and tracking errors wherein the holographic recording beams and the servo beams are generated by two light sources wherein the holographic data are recorded with wavelength 658 nm and the servo beam is generated by light source (26, Figure 1) with wavelength 780 nm *to avoid the cross talk and unwanted interference between the holographic recording and retrieving beams and the servo signal detecting beam.*

The applicant disagrees with this assessment of Amble and respectfully submits that Amble does not disclose, teach, or suggest use of different wavelength light sources for the purpose of avoiding cross talk and unwanted interference anywhere in his application. Instead, Amble uses different wavelength light sources for the specific purpose of passing, reflecting, blocking, or absorbing light in different places in his invention. With regard to his apparatus shown in FIG. 1, Amble discloses that R/W (signal) beam 12 of one wavelength passes through a dichroic mirror 22 [0052] while servo beam 24 of another wavelength reflects off the dichroic mirror 22 [0053]. This configuration is not used to eliminate cross talk; rather, the beams of different wavelength and the dichroic mirror are used in order to place the signal beam and the servo beam (which originate from different light sources) on a common optical path. Further, referring to Amble's FIG. 4A – 4D, Amble uses different wavelengths for his signal beam and servo beam in order to pass through different blocking/absorbing layers in his optical recording

medium, and thus focus the respective beams at different depths of the optical recording medium [0074].

In contrast, claims 1, 3, and 6 recite "a reference beam emitted from a first light source and having a wavelength λ0 … and a servo beam emitted from a second light source and having a wavelength λ1." In some non-limiting embodiments, this makes it possible to set a diffracted angle of the servo beam and select the wavelength λ1 of the servo beam in accordance with the track pitch without being restricted by wavelength conditions for recording data or reproducing data, *e.g.*, eliminating cross talk.

d. Amble propagates beams on a common optical path

Further, Amble does not disclose, teach, or suggest "setting a first optical path of the signal beam … and setting a second optical path, different than the first optical path, of a servo beam" as recited in amended claims 1, 3, and 6 of the present application. Amble's invention comprises two light sources, but Amble makes no provision for different optical paths. Unlike the different optical paths recited in amended claims 1, 3, and 6, Amble directly shows and describes both signal and servo beams on a common optical path.

Amble's FIG 1, shows an optical storage medium oriented vertically; where a recording data plane 18 is to the left, and a servo plane 34 is to the right. It is evident from FIG 1 that the R/W beam 12 is focused on R/W focus spot 16 and servo beam 24 is focused on servo focus spot 32 [0054]. *E.g.*, the signal and servo beams travel along the same optical path, but are focused at different depths in the optical recording medium. The common optical path in Amble is further described where Amble focuses servo beam 24 with lens 30 through objective lens 14 to focus servo beam 24 to a servo focus spot 32 on a servo or guide plane 34 [0053], and focuses the R/W beam 12 through objective lens 14 which focuses beam 12 to a R/W focus spot 16 [0056].

Unlike the recitations in amended claims 1, 3, and 6, Amble does not disclose, teach, or suggest a signal beam and a servo beam on different optical paths. Instead, Amble's invention is directed toward a system that implements a multiple-stage servo sub-system capable of focusing a servo beam at different depths in the optical storage medium. There is no

motivation for one skilled in the art to view Amble's invention and then create a system of "setting a first optical path of the signal beam … and setting a second optical path, different than the first optical path, of a servo beam." Accordingly, amended claims 1, 3, and 6 are allowable.

e. Curtis does not teach the inventive features of the present application

In section 4, the final Office Action states that Curtis' Figure 11 teaches that the servo marks are *only* formed in the *periphery* of the holographic recording medium, which suggests that the projection of the servo beam and the projection of the signal beam should be at different locations (servo beams only at the servo marks). The final Office Action further states in section 4 that it would then be obvious, if it is not already the case of Curtis, to one skilled in the art to modify the beam projections direction of the signal beam and the servo beam being different from each other so that the retrieving/recording of the holographic data information and the retrieving of the servo signal will not interfere each other so that unwanted reading noise would not be created.

The applicant disagrees with this characterization of Curtis. First, the applicant submits that Curtis shows servo marks 210 at the periphery of the holographic medium 124' in Figure 11 only for convenience. Second, even if Curtis relies on a periphery arrangement of servo marks 210, Curtis only contemplates an optical arrangement where the servo system and the signal system share common components and common optical paths. Finally, Curtis discloses his known servo arrangements, and none suggest the features recited in the amended claims. Therefore, Curtis does not in any way disclose, teach, or suggest to one skilled in the art the features recited in the claims 1, 3, and 6.

i. Curtis' Figure 11 shows servo marks at the periphery only for convenience of the illustration

The applicant acknowledges that Curtis shows servo marks 210 only in the periphery of his holographic medium 124', however, Curtis discloses no such limitation in his specification and teaches away from such a limitation in the paragraph that spans col. 14 and 15. For example, Curtis recites, "The marks can be very similar to what is used or contemplated for

CD or DVD optical disks" (col. 15, lines 10-11). As is known, CDs and DVD optical disks generally employ a spiral groove for tracking and servo marks that are not limited to the periphery of the medium. However, even in embodiments of Curtis' invention that do employ servo marks 210 only at the periphery, Curtis' entire optical mechanism would have to move to the periphery to read them. It would not be possible, as suggested by the Examiner, for Curtis to modify the beam projection directions of the signal beam and servo beam in such a manner that would allow "setting a first optical path of the signal beam … and setting a second optical path, different than the first optical path, of a servo beam" because of the relationship between the beams and the holographic material 124 that Curtis requires.

ii. Curtis' beams are all perpendicular to the recording surface

In his discussion of Figure 6, Curtis clearly describes a signal beam 142 that is both directed toward the object lens 122 and substantially parallel to the reference beam 140 optical axis or media normal. *E.g.*, the signal beam 142 and the reference beam 140 travel in parallel toward the object lens 122 along a path perpendicular to the holographic medium 124. This conclusion is clearly shown in Figure 6 and further described by Curtis when he discloses that the signal beam 142 is emitted along a path parallel to the holographic medium 124 and the signal beam 142 strikes a reflective surface 120*b* that is placed at a 45-degree angle to the signal beam's 142 optical path (col. 7, lines 52-64). It is evident that when the signal beam strikes the reflective surface at a 45-degree angle, the result is a 90-degree direction change of the signal beam to a direction perpendicular to the holographic medium 124. Accordingly, the signal beam 142 is traveling in an optical path parallel to the reference beam 140 and both beams strike the holographic medium 124 normal.

iii. Curtis' servo beam, signal beam, and reference beam share a common object lens

There is further evidence against a conclusion that Curtis teaches "setting a first optical path of the signal beam … and setting a second optical path, different than the first optical path, of a servo beam" as recited in the amended claims of the present application. In

Figures 4, 6-8, and 11, Curtis discloses a common object lens 122 through which servo beams 240, reference beams 140, and signal beams 142 all pass *while traveling a common optical path*.

Figure 11 clearly shows the servo beam 240 and the reference beam 140 traveling in parallel, along the same optical path, through the object lens 122.

Figure 12 clearly shows the servo beam 240 and the signal beam 142 traveling in parallel, along the same optical path, through the object lens.

Accordingly, Curtis' servo beam 240, signal beam 142, and reference beam 140 are all traveling through the object lens 122 and to the holographic medium 124 along the same optical path. Contrary to amended claims 1, 3, and 6 of the present application, which recite different optical paths, Curtis does not disclose, teach, or suggest different optical paths. Additionally, new claim 7 recites "the first optical path of the signal beam and the second optical path of the servo beam are oblique," thereby further distinguishing over Curtis.

iv. Curtis discloses his known servo beam arrangements and none are like the present application

Curtis teaches three servo beam arrangements, none of which individually or in any motivated combination disclose, teach, or suggest the features recited in the pending claims. Curtis discloses a servo beam used with a dichroic element, (col. 15, line 13), a servo beam used with a transparent mask (col. 15, line 14), and a servo beam of one wavelength focused in the recording medium and a signal beam of a second wavelength focused at a different level in the recording medium (col. 15, lines 35-46). Nevertheless, in each of these three arrangements, Curtis focuses all of his beams along a common optical path. It would not be obvious to one skilled in the art to view Curtis in further view of Amble and then arrange a method and apparatus "setting a first optical path of the signal beam … and setting a second optical path, different than the first optical path, of a servo beam" as recited in amended claims 1, 3, and 6 of the present application.

III. Discussion of Provisional Double Patenting Rejections

In paragraph 8 of the final Office Action, the Examiner raised the doctrine of judicially created obviousness-type double patenting and provisionally rejected claims 1-6 as unpatentable over copending Application No. 10/800,607. In light of the amendments made to the claims of the present application and the arguments above, the double patenting rejection is rendered moot, and the applicant requests that the rejection be withdrawn.

IV. New Dependent Claim 7

The applicant has added new dependent claim 7, which recites "the first optical path of the signal beam and the second optical path of the servo beam are oblique." The cited prior art does not disclose, teach, or suggest optical paths that are not parallel. Accordingly, claim 7 is allowable.

V. Information Disclosure Statement (IDS)

A supplemental IDS, form PTO-1449 having references listed thereon, and a copy of non-U.S. patent reference(s) are being submitted with this amendment. The Examiner is kindly requested to enter and consider these references, and to include an initialed copy of the form PTO-1449 along with the next communication, so as to confirm that the references listed therein have been considered. Because this supplemental IDS is being filed with the RCE, a fee is not required for its submission.

VI. Conclusion

Overall, none of the references singly or in any motivated combination disclose, teach, or suggest what is recited in the independent claims. Thus, given the above amendments and accompanying remarks, the independent claims are now in condition for allowance. The dependent claims that depend directly or indirectly on these independent claims are likewise allowable based on at least the same reasons and based on the recitations contained in each dependent claim.

The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

All of the claims remaining in the application are now clearly allowable. Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,

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Enclosures:
Request for Continued Examination
Supplemental Information Disclosure Statement

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